



HAZARDOUS
SITE CONTROL
DIVISION

**Remedial
Planning/
Field
Investigation
Team
(REM/FIT)**

ZONE II

CONTRACT NO.
68-01-6692

CH₂M  HILL
Ecology &
Environment

EPA Region 5 Records Ctr.



339745

FINAL
REMEDIAL INVESTIGATION REPORT

FIELDS BROOK SITE
ASHTABULA, OHIO

WA 19.5L46.0
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March 28, 1985

EXECUTIVE SUMMARY

BACKGROUND

The Fields Brook site is in the City of Ashtabula, Ashtabula County, in northeastern Ohio. The site was determined by the United States Environmental Protection Agency (U.S. EPA) and the Ohio Environmental Protection Agency (Ohio EPA) to contain contaminated sediment resulting from industrial discharges to the brook over a number of years. Because of the possibility of direct contact with the sediment, movement of the contaminated sediment into the Ashtabula River (and then Lake Erie), possible movement of contaminants into the public water supply of the City of Ashtabula, and the possibility of uncontrolled releases of hazardous materials from the sediment, the site was included by U.S. EPA on the National Priorities List of uncontrolled hazardous waste sites under the Comprehensive Environmental Response, Compensation, and Liability Act of 1980 (CERCLA).

Fields Brook drains a 5.6-square-mile watershed in Ashtabula County. The upstream reach of Fields Brook flows through an industrial area that was one of the largest and most diversified concentrations of chemical plants in Ohio. Near its confluence with the Ashtabula River (8,000 feet upstream of Lake Erie), the brook flows through a residential area in the City of Ashtabula.

In general, various industrial sources are believed to have contaminated the sediment in Fields Brook with a variety of organic and heavy metal pollutants. Organics reported in sediment sampled during previous studies include toluenediamine, toluene diisocyanate, trichloroethene, tetrachloroethene, hexachlorobutadiene, hexachlorobenzene, polychlorinated biphenyls, hexachloroethane, 1,2,4-trichlorobenzene, vinyl chloride, 1,1-dichloroethene, 1,1,1-trichloroethane, 1,1,2-trichloroethane, and chlorobenzene. Metals (zinc, mercury, chromium, lead, and titanium) at concentrations reportedly above background have also been found in the sediment.

Chemical analysis of sediment core samples, collected by the Corps of Engineers (COE) in 1982, indicated sediment in the Ashtabula River in the vicinity of Fields Brook may be regulated under the Toxic Substance Control Act (TSCA) because of the presence of PCB's.

Analysis of tissue from fish caught in the Ashtabula River and Fields Brook in previous studies indicates the presence of chlorinated organic compounds such as PCB's, hexachlorobenzene, and hexachlorobutadiene. The Ohio Department of

Health/Ohio EPA issued a health advisory on March 1, 1983, entitled "Joint Statement of Health Advisory for Consumption of Ashtabula River Fish" recommending that people not eat fish caught in a 2-mile length of the Ashtabula River, from the mouth of the Ashtabula River (including the harbor area within the breakwater) to the 24th Street Bridge, because of possible contamination from PCB's and other organic chemicals.

REMEDIAL INVESTIGATION

The Remedial Investigation (RI) gathered site-specific data that, when added to previously available information, would provide a basis for a determination of endangerment and the identification and evaluation of remedial action alternatives at the site. When the RI began, the existing data base for the Fields Brook site was insufficient to allow the selection, screening, and evaluation of remedial action alternatives for onsite or offsite control in accordance with the provisions of the National Contingency Plan (NCP).

This document contains mostly data gathered as part of this remedial investigation. Data from other sources are acknowledged.

The RI field activities for the Fields Brook site were conducted in two phases. Phase I sampling, in June 1983, included collecting sediment, surface water, industrial effluent, macroinvertebrate, and fish samples. Phase II, conducted in June 1984, involved the collection of sediment samples from additional locations along Fields Brook and its tributaries.

Phase I RI sampling activities at Fields Brook included:

- o Collecting sediment samples from 19 areas in Fields Brook and its tributaries. Six additional sediment samples were collected from the Ashtabula River.
- o Collecting surface water samples from locations consistent with the sediment sampling sites.
- o Sampling the NPDES permitted industrial outfalls and one storm drain discharging into Fields Brook.
- o Obtaining aquatic macroinvertebrate samples from five locations in Fields Brook and the Ashtabula River.
- o Collecting fish from five areas in Fields Brook and the Ashtabula River.

Phase II sampling activities included:

- o Collecting sediment samples from 16 additional areas in Fields Brook and its tributaries.

SAMPLING RESULTS

Results from analysis of samples collected during the RI indicate the presence of a variety of priority pollutant compounds in sediment, surface water, and fish from Fields Brook. In addition, many of these priority pollutant compounds were detected in similar samples from the Ashtabula River below its confluence with Fields Brook.

Organic compounds detected in sediment samples included volatile organic compounds (VOC's), chlorinated benzene compounds, polynuclear aromatic (PNA's) compounds, hexachlorobutadiene, and PCB's. Several inorganic constituents including barium, cadmium, chromium, selenium, and mercury were detected in sediment samples at concentrations greater than concentrations in background sediment samples.

Several volatile organic compounds (1,1,2,2-tetrachloroethane, tetrachloroethene, trichloroethene), PCB's, and hexachlorobenzene were detected in fish tissue samples from more than one fish collected during the RI. The reported concentration of PCB's in one fillet sample (3.09 mg/kg) exceeds the U.S. FDA recommended maximum PCB concentration in fish for consumption (2 mg/kg).

Concentrations of PCB's in sediments greater than 50,000 ug/kg were reported in samples from Fields Brook in the vicinity of State Road, at State Highway 11, and from the Ashtabula River adjacent to its confluence with Fields Brook.

SUMMARY OF OBSERVATIONS

Generally, chlorinated benzene compounds, PNA's, hexachlorobutadiene, and PCB's were not detected in sediment and surface water samples from locations in the Fields Brook watershed upstream of Fields Brook's confluence with the Detrex tributary. VOC's, chlorinated benzene compounds, PNA's, hexachlorobutadiene, and phthalate compounds were reported in relatively high concentrations in sediment collected from the DS tributary, the Detrex tributary, and Fields Brook downstream of the Detrex tributary to STH 11.

Chlorinated benzene compounds, VOC's, hexachlorobutadiene, and PCB's were detected in Ashtabula River sediment or surface water samples at locations at or downstream of the river's confluence with Fields Brook. Several compounds detected in sediment samples from Fields Brook and the

Ashtabula River (1,1,2,2-tetrachloroethane, tetrachloroethene, trichloroethene, hexachlorobenzene, and PCB's) were detected in more than one fish tissue sample.

Organic compounds detected in surface water samples were also detected in sediment and/or industrial effluent samples.

LIMITATIONS OF THIS RI

SOURCE IDENTIFICATION

The specific sources of contaminants detected in the sediment of the Fields Brook watershed have not been identified. General source location can be inferred from the data. However, it is unknown if these sources are historic or ongoing in nature.

At several locations (for example on the DS tributary), concentrations of constituents in sediment increase with depth. The mechanisms that produced this apparent trend have not been defined. In addition, where contaminant concentrations in sediment are increasing with depth, the downward extent of these contaminants has not been determined.

EXPOSURE ASSESSMENT

An assessment of the site's potential to pose a threat to human health, welfare, or the environment has not been conducted using the data obtained during this RI. Water data were compared to established standards and/or criteria, and sediment data were compared to background or typical concentrations in soil to determine if contamination exists. Contamination is defined as levels of constituents above standards, criteria, and/or background. Contamination does not necessarily imply a hazard to human health, welfare, or the environment.

GLT506/10

Section 2 SITE DESCRIPTION

LOCATION

As shown in Figures 2-1 and 2-2, Fields Brook drains a 5.6-square-mile watershed in Ashtabula County, in northeastern Ohio. The eastern portion of the watershed drains Ashtabula township and the western portion of the watershed drains the eastern section of the City of Ashtabula.

The 3.5 miles of main channel begins just south of U.S. Highway 20, about one mile east of State Highway (STH) 11. From this point the stream flows northwesterly, under U.S. Highway 20 and Cook Road, to just north of Middle Road. Then the stream flows westerly to its confluence with the Ashtabula River. From Cook Road downstream to STH 11, the stream flows through an industrial area that is one of the largest and most diversified concentrations of chemical plants in Ohio. Downstream of STH 11 to near its confluence with the Ashtabula River, the brook flows through a residential area in the City of Ashtabula.

The Ashtabula River empties into Lake Erie about 8,000 feet downstream of Fields Brook.

SITE HISTORY

The U.S. EPA in its April 1982 "Toxic Summary Report" has summarized pre-1982 sampling activities on the brook. Copies of previous investigations and inspection reports discussed in this report are attached as appendixes to that report. Various industrial sources are reported to have contaminated the sediment in Fields Brook with a variety of organic and heavy metal pollutants. Organics reported in sediment sampled during previous studies include toluenediamine, toluene diisocyanate, trichloroethene, tetrachloroethene, hexachlorobutadiene, hexachlorobenzene, polychlorinated biphenyls (PCB's), hexachloroethane, 1,2,4-trichlorobenzene, vinyl chloride, 1,1-dichloroethene, 1,1,1-trichloroethane, 1,1,2-trichloroethane, and chlorobenzene. Metals (zinc, mercury, chromium, lead, and titanium) at concentrations reportedly above background have also been found in the sediment by other investigators.

Sediment in the Ashtabula River at and downstream of the confluence with Fields Brook also may have been contaminated by the discharges along Fields Brook. The contaminated sediment in the river limits potential disposal options for the Corps of Engineers when it dredges the river to maintain navigation.

Analysis of tissue from fish caught in the Ashtabula River and Fields Brook in previous studies indicates the presence of chlorinated organic compounds such as hexachlorobenzene and hexachlorobutadiene. Chlorinated styrenes also have been measured in these fish. Bioaccumulation of these compounds may pose a secondary threat to human health through consumption.

A 1976 study by the U.S. EPA Environmental Research Laboratory (ERL) in Duluth reports that fish taken in and near Fields Brook show the greatest variety of chlorinated organics of all rivers studied within 60 major United States watersheds. A followup study in 1978 substantiated the results of the 1976 study and reported the presence of PCB's and hexachlorobenzene.

The U.S. EPA Great Lakes National Program Office funded a 1979 study to investigate sediment contamination. Again, the concentrations of organics, particularly hexachlorobenzene and hexachlorobutadiene, were found to be higher in Fields Brook and at the mouth of the Ashtabula River than in other rivers of the Great Lakes region. This study also reported that Fields Brook sediment samples contained polychlorinated solvents downstream of two industrial facilities.

The 1982 U.S. EPA Toxic Summary Report also assembled information on hazardous waste generators affecting the Ashtabula area. In accordance with RCRA, reconnaissance inspections were conducted at 10 of the area facilities. Reports following these inspections review each industry's activities and the handling of potentially toxic and hazardous materials. The results of these investigations identify a number of organic priority pollutants potentially in the effluents.

Industrial point dischargers currently have NPDES permits for conventional water quality parameters, but the permits do not generally contain provisions for nonconventional parameters such as organic priority pollutant compounds. Potential nonpoint sources, including abandoned landfills, abandoned lagoons, and drummed or bulked material storage sites, may be discharging contaminants into the stream.

In 1983, outfalls that were identified as contributing to the tributaries flowing into Fields Brook included Acme Scrap Metal; Detrex Chemical Industries, Inc.; Diamond Shamrock Corporation; General Tire and Rubber Co. (presently known as Gen.-Corp.); Gulf and Western (G&W) National Resources (G&W TiO_2 and G&W $TiCl_4$ are presently known as SCM-Plant 2); Reactive Metals, Inc. (RMI); and the SCM Corporation (presently called SCM-Plant 1). Potential nonpoint discharges to Fields Brook include the International Minerals Corporation (presently known as LCP Chemicals-Ohio); Cleveland Electrical Illumination Company; Union Carbide/

Elkem Metals (known as ELKEM, and L-TEC Welding and Cutting Systems); the area south of Cleveland Electric Illuminating Company's coal pile; and several closed landfills.

The remainder of this report along with the figures refer to the outfalls as they were known in 1983.

PHYSIOGRAPHY

Fields Brook drains a portion of the Eastern Lake Section of the Central Lowland Province, commonly referred to as the Lake Plain. This belt, about 3 to 5-1/2 miles wide, consists of the present day Lake Erie bluffs, glacial lake beach ridges south of the Lake Erie bluffs, the glacial Lake Warren Terrace (basically between STH 531 and U.S. Highway 20), the Lake Warren beach ridges (U.S. Highway 20 generally follows this ridge) and, to the south, the Ashtabula Moraine (part of the escarpment separating the Central Lowland Province from the Appalachian Plateaus Province to the south; STH 84 generally follows the base of this escarpment).

GEOLOGY

The bedrock underlying the Fields Brook watershed is silicious Devonian age shale of the Chagrin member of the Ohio Formation. The Ohio Formation is several hundred feet thick and consists of interbedded layers of shales and sandstone. At other locations within Ashtabula County, the interface between the shale and the overburden has been described as varying between a soft, decomposed weathered shale to solid unweathered shale. The Chagrin member has been reported by U.S. EPA (Toxic Summary Report) to have a lower hydraulic conductivity compared to overlying materials and to be anisotropic, limiting the vertical movement of groundwater. Potential groundwater contamination is believed by U.S. EPA (Toxic Summary Report) to be confined to the unconsolidated deposits above the shale.

The overburden materials, described as glacial tills, are reported to average about 25 feet in thickness but may vary from 0 to 60 feet thick in the Fields Brook watershed. These tills are the result of the Wisconsin glacial stage and vary with location. Silts and clays (primary illite and chlorite) are predominant.

SOIL

According to the Soil Conservation Service Soil Survey of Ashtabula County, three soil units are present in the basin. These are the Conneaut silt loam, the Swanton fine sandy loam, and manmade land. The Conneaut silt loam is a nearly level, poorly drained soil formed in lake deposits. It is

REACTIVE METALS INCORPORATED

Reactive Metals Incorporated (RMI) operates three manufacturing plants in the Fields Brook basin. The extrusion plant processes ferrous and nonferrous billets into rod, tube, and other shapes. Metals processed have included copper, nickel, molybdenum, cobalt, zirconium, steel, aluminum, titanium, tin, beryllium, zinc, and uranium. A radiation survey conducted on March 25, 1980, noted elevated radiation levels in Fields Brook near the site, but detected no radiation levels in excess of NRC standards.

The metals reduction plant combines sodium and titanium tetrachloride to produce titanium sponge. Leach water and wash water from the plant are settled in ponds and then discharged to the sodium and chlorine plant. Other wastewaters (pot wash, noncontact cooling water, boiler blowdown, and drainage) are collected in lagoons prior to discharge to Fields Brook.

The sodium and chlorine plant produces sodium metal and chlorine through electrolysis of brine.

SCM CORPORATION

SCM Corporation manufactures titanium dioxide and titanium chloride in a process similar to that described for Gulf and Western. The plant also produced barium and strontium products between 1968 and 1970. Remnants of the facilities and lagoons associated with those products are west of the current site. All current process wastewater and stormwater is routed to treatment which consists of pH adjustment, settling, and neutralization. The plant has a 1-million-gallon retention basin for capture of spills. Solid waste is hauled offsite.

UNION CARBIDE/ELKEM METALS

Union Carbide operates the Linde Gas Plant, Linde Welding Materials Plant, and a ferroalloy plant. The gas plant refines specialty gases from purified air. The welding products plant manufactures welding rod and wire utilizing a variety of cleaning agents and flux materials, such as potassium permanganate, caustic soda, sulfuric acid, muriatic acid, copper, sulfate, borax, nickel, and chromium.

Wastewaters from the ferroalloy plant derive largely from fume cleaning. They include cyanide and phenolic wastestreams. Wastewaters are treated and discharged to Lake Erie, and most of the currently active site drains north to Lake Erie. The property does extend south to Middle Road in 1979 and some of the older lagoons for onsite storage of sludges may be in the Fields Brook drainage basin.